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The Canadian National Collection of Insects, Arachnids and Nematodes

The Research Branch of Agriculture and Agri-Food Canada (AAFC) is home to one of the world's finest resources in support of biodiversity research and conservation. The Canadian National Collection of Insects, Arachnids and Nematodes (CNC) is a top-notch working collection located at the K.W. Neatby Building of the Eastern Cereal and Oilseed Research Centre (ECORC) in Ottawa. The collection, which contains approximately 16 million specimens, is one of the five largest catalogues in the world. Research Branch scientists routinely use the collection to conserve Canada's biodiversity in a number of ways. For instance, the CNC helps them:

- rapidly identify unknown species and develop control measures to reduce invasive alien species in Canada;
- support publication of books such as "Canada and its Insect Fauna", "Butterflies of Canada" and "Insects of the Yukon"; and
- identify and answer questions on insects, arachnids and nematodes.

The first insect collection at AAFC dates back to 1886 when the Experimental Farm system was first established. The CNC is one of the longest continuous programs at AAFC, originating in 1886 when James Fletcher donated his private collection after he was appointed as the first Dominion entomologist. His appointment was the result of an order-in-council strongly recommended by William Saunders, the first director of the Experimental Farm Branch.

The CNC is one of the five largest collections of its kind in the world. The CNC contains approximately 16 million specimens of insects, spiders, mites and roundworms (nematodes), and is one of the preeminent national collections in the world. Though more than 75% of the collection originates from North America, it contains specimens of species from all over the Earth.

The oldest insects in the CNC are about 75 million years old. In addition to existing species, the CNC houses a large collection of fossil insects in Canadian Cretaceous amber from Medicine Hat, Alberta, and Cedar Lake, Manitoba, dating back to the age of the dinosaurs.

Over 60,000 species of insects and relatives live in Canada, but half of them are unknown. Although over 35,000 named species of insects, spiders, mites, and roundworms are known to occur in Canada, scientists believe that there is about the same number of species here that have yet to be catalogued. Research Branch scientists working with the CNC are tackling the task of differentiating, describing and naming these new species.

Fast facts about the CNC

The Canadian National Collection of Insects, Arachnids and Nematodes was transferred to AAFC because of a fire that ravaged the Parliament buildings in 1916. Following the disaster of 1916, members of Parliament moved to the Victoria Museum. That made things pretty crowded there, so the museum's insect collection was combined with the one belonging to the federal Department of Agriculture in 1917. The resulting merger became the Canadian National Collection (CNC).



The CNC's curators are world experts in different groups of insects and relatives. These scientists are primarily taxonomists — they identify, describe and name newly discovered species from Canada and around the world. Specialists focus on different aspects of the collection, from beetles to mites and more. CNC taxonomists often get requests from all over the world to find out whether a specimen has already been described or is a new, native or introduced species.

Body features are one of the best ways to classify insects. Insects have developed amazingly elaborate sex organs that allow mating only with members of the same species. These sex organs are often the most useful characteristics for distinguishing species. Different species have also evolved specific songs and perfumes that the other gender can detect miles away when looking for a mate.

Deoxyribonucleic Acid (DNA) can be used to identify species of insects or relatives. Although taxonomists generally use body characteristics to distinguish species, some species are just too much alike for this to always work. That's when scientists turn to the study of DNA to find the answers. Several CNC taxonomists regularly use DNA to identify species and solve problems related to crop pests or invasive species.

Most insects are beneficial to humans. The majority of specimens housed in the CNC are directly or indirectly helpful to humans by keeping crop pests in check, or by keeping ecosystems sustainable through plant pollination, decomposition, nutrient cycling and the provision of food for larger animals.

One of the best ways to fight insect pests is to have other insects do it for you. Most crop and livestock pests have been introduced accidentally from other parts of the world. Fortunately, these pests have their own natural enemies, predators and parasitoids that feed on them. Pest populations can be kept below damaging thresholds by making conditions more favourable for native predators and parasitoids or by carefully introducing biocontrol agents from the area of origin of the pest. This approach helps reduce risks associated with chemical control on human health and the environment. CNC taxonomists work with biological control specialists in Canada and around the world to develop biological control strategies for crop and animals pests.

The identification of pests, their natural enemies, and other beneficial species is key to environmental and agricultural sustainability.

Part of the work of Research Branch taxonomists is to identify pests that attack our crops and livestock, as well as their natural enemies and other beneficial species in Canada. To know what species are involved is the first step towards sustainable management of ecosystems. Once you know the identity, you then have access to all the known information on that species and can develop biologically based management strategies.

The CNC helps keep invasive alien species out of Canada, thereby helping to protect our agriculture and environment. Thousands of insects, arachnids, nematodes, and their relatives are submitted each year to the National Identification Service for identification. This work is done by the CNC taxonomists. Many of these samples come from plant and animal products — such as flowers, fruits, packaging wood — brought from overseas and intercepted at our borders. The accurate identification of these insects by our taxonomists is crucial: if the species are deemed a danger to our crops or wilderness areas, then steps must be taken to prevent them from establishing themselves in Canada.

